SELF-HEAT-CONDUCTIVE HEAT DISSIPATING MODULE

Background of the Invention

1. Field of the Invention

The present invention relates to a self-heat-conductive heat dissipating module, and particularly to a heat dissipating module which can transfer heat effectively from the CPU of a computer or a device which generates a large amount of heat. The present invention comprises a plurality of heatsinks which are overlapped, but which can be mechanically separated and have a discontinuous contact interface and a plurality of heat convection superconductive tubes containing high temperature superconductor composites.

2. Description of Prior Art

The heat dissipating devices for central processing units (CPU's) of computers or high heat generating devices use heatsink devices with a plurality of metal fins to contact the heat sources, absorb heat and then transfer heat to the fins. Then heat-dissipating fans are used to blow cold air to disperse the heat.

The prior art is effective for heat from a small CPU, but for a CPU generating a large amount of heat, it cannot operate effectively since the metal base of the heatsink, which contacts the heat source, is spaced with the distal ends of the fins. Just by the way that heatsink base contacts the heat source (i.e. CPU), the heat from the base of the heatsink cannot be transferred to the distal ends of the fins, and the root portions of the fins and the distal ends absorb unequal amount of heat. In other words, the portion near the root of the

base of the heatsink absorbs more heat, and the distal ends of the fins absorb much less heat. As a result, the root is the only portion of the base of the heatsink used to dissipate heat. Therefore, the aforesaid conventional heat dissipating device cannot match the requirements of the newly developed CPU's with high operation speeds.

Summary of the invention

Accordingly, the primary object of the present invention is to provide a self-heat-conductive heat dissipating module, wherein the self-heat-conductive heat dissipating module has two heatsinks, a lower heatsink and an upper heatsink, which are overlapped. At least one heat convection superconductive tube containing a high temperature superconductor composite is engaged with the two heatsinks. A heat dissipating fan blows air across the two heatsinks to increase the heat dissipating efficiency.

Another object of the present invention is to provide a self-heat-conductive heat dissipating module with a plurality of self-heat-conductive heat dissipating modules having heatsinks which are overlapped, with fins facing fins. The heatsinks are mechanically separated and have a discontinuous contact interface, with a plurality of heat convection superconductive tubes containing a high temperature superconductor composite.

The heat convection superconductive tubes are made of bendable metal tubes (for example, copper, aluminum, etc.) containing high temperature superconductor composites such as yttrium barium copper oxide (YBCO), thallium barium calcium copper oxide (TBCCO), mercury barium calcium copper oxide (HBCCO), bismuth strontium calcium copper oxide (BSCCO), or other superconductor material, or other heat conductive

material. Two ends of the tube are closed to prevent the superconductor material from draining out of the tube. Therefore, the heat convection superconductive tube is formed by a metal tube containing the superconductor material enclosed therein. The principle used is that when the molecules in the tube are heated, heat energy can be transferred by convection due to the rapid oscillation and large friction. Therefore, the heat can be transferred rapidly.

Since the heat transfer time in the heat convection superconductive tube from a hot end to a cold end is very short, the temperature difference between the hot end and the cold end is very small. Thus an optimum heat transfer can be acquired. It should be noted that the speed of heat transfer in the present invention is about five times that of copper. Furthermore, the heat transfer is quicker than general extruded aluminum heatsinks.

As the temperatures of the hot end and the cold end of the heat convection superconductive tube are very close, the temperature of the base of the lower heatsink, which engages the hot end of the heat convection superconductive tube, is highest. The temperature of the top face (base also) of the upper heatsink, which engages the cold end of the heat convection superconductive tube is highest. Therefore, the temperature of the contacting interface between the lower heatsink and the upper heatsink will be the lowest. From the contacting interface, temperature rises continuously toward the top face of the upper heatsink. The direction of heat flow in the upper heatsink is downward. If the structure has a continuous contact interface between the lower heatsink and the upper heatsink, the downward heat flow of the upper heatsink will impair heat dissipation of the lower heatsink, and heat dissipation of the CPU will be impaired overall. In the present invention, the lower heatsink and the upper heatsink are mechanically separated and

discontinuous at the contact interface.

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawings.

Brief Description of the Drawings

Fig. 1 is an exploded perspective view of the self-heat-conductive heat dissipating module of the present invention having two heatsinks and a plurality of U- shaped heat convection superconductive tubes.

Fig. 2 is a perspective view showing the elements of Fig. 1 assembled with a heat dissipating fan installed.

Fig. 3 is an exploded perspective view of the self-heat-conductive heat dissipating module of the present invention, wherein fins of two heatsinks are alternated, with a plurality of U-shaped heat convection superconductive tubes and a heat dissipating fan being used.

Fig. 4 is a perspective view showing the elements of Fig. 3 assembled.

Fig. 5 is an exploded perspective view of the present invention, wherein two double V-shaped heat convection superconductive tubes and two heatsinks are assembled.

Fig. 6 is a perspective view showing the elements of Fig. 5 assembled.

Fig. 7 is a perspective view showing a pair of heatsink sets, each being formed by two heatsinks, with the two heatsink sets assembled into one composite self-heat-conductive heat dissipating module of the present invention.

Detailed Description of the Preferred Embodiments

Referring to Fig. 1, the self-heat-conductive heat dissipating module of the present invention heatsink 1, heatsink 2, and a plurality of heat convection superconductive tubes 3.

In the present invention, there are two heatsinks which are mechanically separated and discontinuous in structure.

Fig. 1 shows the first embodiment of the present invention. Heatsink 1 has a plurality of fins 11 connected to the base 10. Heatsink 2 has a plurality of fins 21 connected to the base 20. Base 10 of heatsink 1 has a plurality of trenches 12, and base 20 of heatsink 2 (top face of upper heatsink) has a plurality of trenches 22. The heat convection superconductive tubes 3 are bent to have a U shape. Lower sections 31(hot ends) of the U-shaped tubes 3 are placed in trenches 12 , upper sections 32(cold ends) of the U-shaped tubes 3 are placed in another set of trenches 22. Heatsink 1 and heatsink 2 are assembled as one set.

The heat convection superconductive tubes 3 have the effect of buckling two heatsinks (referring to Fig. 2). The bottom of the base 10 of the heatsink 1 with lower sections 31 (hot ends) of the U-shaped tubes 3 serves to contact a heat source, such as a CPU. Therefore, a large amount of heat can be transferred to heatsink 2 through the heat convection superconductive tubes 3.

The reason for using two heatsinks that are mechanically separated and discontinuous at the contact interface is that no convection between the upper heatsink 1 and the lower heatsink 2 occurs, since the upper heatsink 1 and lower heatsink 2 are separated, and thus no heat passes between them.

Since the heat transfer time in the heat convection superconductive tube from a hot end 31 to a cold end 32 is very short, the temperature difference between the hot end 31 and the cold end 32 is very small. As the temperatures of the hot end 31 and the cold end 32 are very close, the temperatures of the lower base 10 and of the upper base 20 will be highest, and the temperature at the contact interface between heatsink 1 and heatsink 2 will be the lowest.

Moving upward from the contact interface, temperature rises continuously toward upper base 20. The direction of heat flow in heatsink 2 is downward. If the structure of the interface is continuous between heatsink 1 and heatsink 2, the downward heat flow of the heatsink 2 will impair heat dissipation of heat sink 1, and the heat dissipation of the CPU overall will be impaired. In the present invention, heatsink 1 and heatsink 2 have a mechanically separated and discontinuous contact interface. Therefore, a self-heat-conductive heat dissipating module is formed by the heat convection superconductive tubes 3 containing high temperature superconductor composites, heatsink 1, and heatsink 2.

A heat dissipating fan 4 is assembled at the side of the two heatsinks to blow cold air to the fins 11 and the fins 21 to achieve a high efficiency heat dissipation.

Fig. 3 shows a second embodiment of the present invention. Heatsink 1 and heatsink 2 are mechanically separated and discontinuous in structure. Base 10 of the heatsink 1 has a plurality of trenches 12, and base 20 of the heatsink 2 has a plurality of trenches 22. The heat convection superconductive tubes 3 are bent to have a U shape. The two ends of the U-shaped tubes are placed in trenches 12 and trenches 22.

Heatsink 1 and heatsink 2 are assembled as one set, and the fins of the two

heatsinks are alternatively arranged. The alternatively arranged fins increases the area of heat dissipation.

The heat convection superconductive tube 3 has the effect of buckling two heatsink (referring to Fig. 4). The base 10 of the heatsink 1 with trenches 12 serves to contact a heat source. Therefore, a large amount of heat can be transferred to heatsink 2 through the heat convection superconductive tube 3. The heat is thus transferred to each heatsink. A heat dissipating fan 4 is assembled at the side of the two heatsinks for blowing cold air to the fins 11 and fin 21 to achieve a high efficiency heat dissipation.

Fig. 5 shows the third embodiment of the present invention. In this embodiment, the heatsinks are identical to those in the first embodiment, which are mechanically separated and discontinuous in structure.

There is a difference between the heat convection superconductive tubes of Fig. 1 and Fig. 5. In the third embodiment (Fig. 5), there are two heat convection superconductive tubes 53 and 54. Both are formed by two U shapes.

A first heat convection superconductive tube 53 is wider that a second tube 54. The two free ends 531, 532 of the double U shapes of the wider heat convection superconductive tube 53 are placed in the two trenches 121, 124. The inner portions 533, 534 of the wider heat convection superconductive tube 53 are placed in the two trenches 221, 224.

The two free ends 541, 542 of the double U shapes of the narrower heat convection superconductive tube 54 are placed in the two trenches 122, 123 at the inner sides. The inner portions 543, 544 of the narrower heat convection superconductive tube 54 are placed in the two trenches 222, 223.

Therefore, in addition to transferring through the fins 11 , the heat absorbed by the base 10 can be transferred to the heatsink 2 through the heat convection superconductive tubes.

Fig. 6 shows a heat dissipating fan 4 assembled at the side of the two heatsinks 1,2 to blow cold air to the fins 11, 21 to achieve a highly efficient heat dissipation.

Fig.7 shows a fourth embodiment of the present invention. In this embodiment, the heatsink sets 71, 72, and the heat convection superconductive tubes 3 are assembled together.

The self-heat-conductive heat dissipating module of the present invention has the following advantages:

1. Heatsinks of self-heat-conductive heat dissipating module of the present invention are mechanically separated and discontinuous in structure, so that heat from the heat generating device can dissipate more rapidly.

2. The adoption of heat convection superconductive tube containing high temperature superconductor composites make heat dissipate more rapidly.

3. In the present invention, a plurality of self-heat-conductive heat dissipating modules can be assembled, the heat from the heat source therefore dissipating even more rapidly.

4. The alternatively arranged fins increase the heat area.

The present invention having been described, it will be obvious that modifications and variations may be easily made without departing from the spirit of this invention. Such modifications and variations are not to be regarded as a departure from the spirit and

scope of the present invention, and all such modifications and variations as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.